

~~BEST AVAILABLE COPY~~



Europäisches Patentamt
European Patent Office
Office européen des brevets

⑪ Publication number:

0 227 213
B1

⑫

EUROPEAN PATENT SPECIFICATION

⑯ Date of publication of the patent specification:
13.06.90

⑮ Int. Cl. 5: **B65D 85/72, B65D 25/02,**
B65B 3/04

⑯ Application number: **86307040.5**

⑯ Date of filing: **12.09.86**

⑯ A beverage package and a method of packaging a beverage containing gas in solution.

⑯ Priority: **29.11.85 GB 8529441**

⑯ Proprietor: **ARTHUR GUINNESS SON & COMPANY (DUBLIN) LIMITED, St. James's Gate Brewery St. James's Gate, Dublin 4(IE)**

⑯ Date of publication of application:
01.07.87 Bulletin 87/27

⑯ Inventor: **Forage, Alan James, Waverley 24 Long Grove Seer Green, Beaconsfield Buckinghamshire(GB)**
Inventor: **Byrne, William John, 9 Clonmore Road, Mount Merrion Dublin(IE)**

⑯ Publication of the grant of the patent:
13.06.90 Bulletin 90/24

⑯ Representative: **Walters, Frederick James et al, Urquhart-Dykes & Lord 91 Wimpole Street, London W1M 8AH(GB)**

⑯ Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

⑯ References cited:
GB-A-1 266 351
GB-A-1 588 624
US-A-3 085 714

EP 0 227 213 B1

ACTORUM AG

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid (Art. 99(1) European patent convention).

Description**TECHNICAL FIELD AND BACKGROUND ART**

This invention relates to a beverage package and a method of packaging a beverage containing gas in solution. The invention more particularly concerns beverages containing gas in solution and packaged in a sealed, non-resealable, container which, when opened for dispensing or consumption, permits gas to be evolved or liberated from the beverage to form, or assist in the formation of, a head or froth on the beverage. The beverages to which the invention relates may be alcoholic or non-alcoholic; primarily the invention was developed for fermented beverages such as beer, stout, ale, lager and cider but may be applied with advantage to so-called soft drinks and beverages (for example fruit juices, squashes, colas, lemonades, milk and milk based drinks and similar type drinks) and to alcoholic drinks (for example spirits, liquors, wine or wine based drinks and similar).

It is recognised in the beverage dispensing and packaging art that the characteristics of the head of froth which is provided on the beverage by the liberation of gas from the beverage immediately prior to consumption are an important consideration to the consumers enjoyment of the product and are therefore of commercial importance. Conventionally beverages of the type discussed above containing gas in solution and packaged in a non-resealable container (such as a can, bottle or carton) provide a headspace in the container within which gas is maintained under pressure. Upon opening of the package, the headspace gas is vented to atmosphere and the beverage is usually poured into a drinking vessel. During such dispensing of the beverage it is usual for gas in solution to be liberated to create the froth or head. It is generally recognised that when dispensing a beverage as aforementioned, the gas is liberated as a result of the movement of the beverage over a surface having so-called gas nucleation or active sites which may be the wall of the drinking vessel into which the beverage is poured. There is therefore a distinct possibility with conventional beverage packages that upon opening of the container after storage and until the beverage is poured therefrom, the beverage will have little or no froth or head - such a headless beverage is usually regarded by the consumer as somewhat unattractive and unappealing especially where the beverage is to be drunk directly from the container. Admittedly it may be possible to develop a head or froth within the container by agitating or shaking the package (so that the movement of the beverage over the interior surface of the container causes the liberation of the gas in solution) but this is clearly inconvenient once the container is opened and is inadvisable if the package is shaken immediately prior to opening as the contents tend to spray or spurt on opening.

When fermented beverages such as beer, ale, stout, - lager and cider are dispensed from a package, among the desirable qualities sought in a head are a consistent and regular, relatively fine, bubble

size; a bubble structure which is substantially homogeneous so that the head is not formed with large irregularly shaped and random gaps; the ability for the head or bubble structure to endure during a reasonable period over which it is likely to be consumed, and a so-called "mouth-feel" and flavour which may improve the enjoyment of the beverage during consumption and not detract from the desirable flavour characteristics required of the beverage. These desirable qualities are of course equally applicable to non-fermented beverages, for example with so-called soft drinks. Conventionally, beverages of the type to which the invention relates are packaged in a non-resealable container which when opened totally vents the headspace to atmosphere, contain carbon dioxide in solution and it is the liberation of the carbon dioxide on opening of the package and dispensing of the beverage into a drinking vessel which creates the froth or head; however, the head so formed has very few of the aforementioned desirable qualities - in particular it is usually irregular, lacks homogeneity and has very little endurance so that there is a tendency for it to collapse after a short period. It has been known for approximately 25 years and as discussed in our G.B. Patent No. 876 628, that beverages having in solution a mixture of carbon dioxide gas and inert gas (such as nitrogen or argon) will, when dispensed in a manner whereby the mixed gases are caused to evolve to develop the head or foam from small bubbles containing the mixture of carbon dioxide and, say, nitrogen gases, provide the desirable qualities for the head as previously discussed. Commercially the formation of the head by the use of mixed gases as aforementioned has been widely employed in the dispensing of beverage in a draught system and on demand from a bulk container (such as a keg or barrel) where the gases are caused to evolve by subjecting the beverage to intense shear forces in passing it under pressure through a set of small holes. Beverages, particularly stout, having a mixture of carbon dioxide and nitrogen gases in solution and dispensed in draught using the aforementioned technique have met with considerable commercial success and it was soon realised that there was a need to make available for consumption a similar beverage derived from a small non-resealable container suitable for shelf storage and retail purposes.

Research has indicated that to achieve the initiation of a head on a beverage containing carbon dioxide and inert gas such as nitrogen in solution it is necessary to provide so-called "active sites" which are regions where the beverage is subjected to a high local strain (such a strain being higher than the cohesive force of the beverage). In these conditions the beverage prefers to generate a bubble of mixed gases instead of "bending around" the active site. In the draught dispensing system aforementioned the small restrictor holes provided an appropriate active site. There has however been a problem in providing an "active site" in a beverage packaged in a non-resealable small container in a manner which is commercially and economically acceptable.

During the past 25 years considerable expenditure

has been devoted to research and development in an attempt to overcome the aforementioned problem. For example, our G.B. Patent No. 1 588 624 proposes initiating the evolution of mixed carbon dioxide and nitrogen gases from a beverage by subjecting the beverage to ultrasonic excitement (which could produce a "ghost" active site by the formation of extreme pressure gradients), by injecting a gas, liquid and/or foam into the beverage by use of a syringe-type device, or by pouring the beverage over an excitation surface such as polystyrene granules. Although these latter proposals were successful in achieving the desired head formation, the necessity to use ancillary apparatus had commercial disadvantages (for example, it is unreasonable to expect a retail customer to have available an ultrasonic signal generator; also the steps required to effect initiation of the head following opening of the beverage package involved an inconvenient discipline and time factor). In a further example our G.B. Patent No. 1 266 351 relates to a non-resealable package containing beverage having mixed carbon dioxide and inert gases in solution; in this disclosure a can or bottle has two chambers of which a larger chamber contains the beverage while the smaller chamber is charged under pressure with the mixed gases. On opening of the can or bottle to expose the larger chamber to atmosphere, its internal pressure falls to atmospheric permitting the pressurised gas in the small chamber to jet into the beverage by way of a small orifice between the two chambers. It was hoped that this jet of gas would provide sufficient energy to initiate the formation of minute bubbles and thereby the head from the evolution of the mixed gases in the beverage coming out of solution. By this proposal the small gas chamber is initially pressurised with the mixed gases to a pressure greater than atmospheric and from a source remote from the beverage; as a consequence it was found necessary, particularly in the case of cans, to provide a special design of two chambered container and an appropriate means for sealing the smaller chamber following the charging of that chamber with the mixed gases (such charging usually being effected, in the case of cans, by injecting the mixed gases into the small chamber through a wall of the can which then had to be sealed). Because of the inconvenience and high costs involved in the development of an appropriate two chambered container, the special facilities required for charging the mixed gases and sealing the container, the proposal proved commercially unacceptable.

There is therefore a need for a beverage package and a method of packaging a beverage containing gas in solution by which the beverage is packaged in a non-resealable container so that when the container is opened gas is liberated from the beverage to form or assist in the formation of a head or froth without the necessity of an external influence being applied to the package; it is an object of the present invention to satisfy this need in a simple, economic and commercially viable manner.

STATEMENTS OF INVENTION AND ADVANTAGES

According to the present invention there is provided a beverage package comprising a sealed, non-resealable, container having a primary chamber containing beverage having gas in solution therewith and forming a primary headspace comprising gas at a pressure greater than atmospheric; a secondary chamber having a volume less than said primary chamber and which communicates with the beverage in said primary chamber through a restricted orifice, characterised in that the secondary chamber contains beverage derived from the primary chamber and has a secondary headspace therein comprising gas at a pressure greater than atmospheric so that the pressures within the primary and secondary chambers are substantially at equilibrium, and wherein said package is openable, to open the primary headspace to atmospheric pressure and the secondary chamber is arranged so that on said opening the pressure differential caused by the decrease in pressure at the primary headspace causes beverage in the secondary chamber to be ejected by way of the restricted orifice into the beverage of the primary chamber and said ejection causes gas in the solution to be evolved and form, or assist in the formation of, a head of froth on the beverage.

Further according to the present invention there is provided a method of packaging a beverage having gas in solution therewith which comprises providing a container with a primary chamber and a secondary chamber of which the volume of the secondary chamber is less than that of the primary chamber and with a restricted orifice through which the secondary chamber communicates with the primary chamber, and charging and sealing the primary chamber with the beverage to contain the gas in solution and to form a primary headspace in the primary chamber, and characterised by charging the secondary chamber with beverage derived from the primary chamber by way of said restricted orifice to form a secondary headspace in the secondary chamber whereby the pressures in both the primary and secondary chambers are at equilibrium and gaseous pressures in both the primary and secondary headspaces are at a pressure greater than atmospheric so that, when the container is broached to open the primary headspace to atmospheric pressure, the pressure differential caused by the decrease in pressure at the primary headspace causes beverage in the secondary chamber to be ejected into the beverage of the primary chamber by way of said restricted orifice and the said ejection causes gas to be evolved from solution in the beverage in the primary chamber to form, or assist in the formation of, a head of froth on the beverage.

The present invention is applicable to a wide range of beverages of the type as previously discussed and where those beverages contain gas in solution which gas is intended to be liberated to form or assist in the formation of the head or froth on the beverage. Understandably the gas in solution must not detract from, and should preferably enhance

the characteristics required of the beverage and be acceptable for use with food products; preferably therefore the gas is at least one of carbon dioxide and inert gases (by which latter term is included nitrogen) although it is to be realised that other gases may be appropriate.

The container employed in the present invention will usually be in the form of a can, bottle or carton capable of withstanding the internal pressures of the primary and secondary chambers and of a size suitable for conventional shelf storage by the retail trade so that, the overall volume of the container may be, typically, 0.5 litres but is unlikely to be greater than 3 litres.

By the present invention a two chambered container is employed as broadly proposed in G.B. Patent No. 1 266 351; however, unlike the prior proposal the secondary chamber is partly filled with beverage containing gases in solution and the beverage in the secondary chamber is derived wholly from the beverage in the primary chamber so that when the contents of the primary and secondary chambers are in equilibrium (and the primary and secondary headspaces are at a pressure greater than atmospheric) immediately prior to broaching the container to open the primary headspace to atmosphere, the pressure differential between that in the secondary headspace and atmospheric pressure causes beverage in the secondary chamber to be ejected by way of the restricted orifice into the beverage in the primary chamber to promote the formation of the head of froth without the necessity of any external influence being applied to the package. The pressurisation of the headspace gas in the secondary chamber is intended to result from the evolution of gas in the sealed container as the contents of the container come into equilibrium at ambient or dispensing temperature (which should be greater than the temperature at which the container is charged and sealed). Consequently the present invention alleviates the necessity for pressurising the secondary chamber from a source externally of the container so that, in a preferred arrangement, the secondary chamber can be formed as a simple envelope or hollow pod of any convenient shape (such as cylindrical or spherical) which is located as a discrete insert within a conventional form of can, bottle or carton (thereby alleviating the requirement for a special structure of can or bottle as envisaged in G.B. Patent No. 1 266 351).

Although the head or froth formed by pouring wholly carbonated beverages tends to lack many of the desirable qualities required of a head as previously discussed; our tests have indicated that by use of the present invention with wholly carbonated beverages (where the head is formed by injection of beverage from the secondary chamber into the primary chamber) the resultant head is considerably tighter or denser than that achieved solely by pouring and as such will normally have a greater life expectancy.

The beverage is preferably saturated or super-saturated with the gas (especially if mixed carbon dioxide and inert gases are employed) and the primary chamber charged with the beverage under a coun-

terpressure and at a low temperature (to alleviate gas losses and, say, at a slightly higher temperature than that at which the beverage freezes) so that when the container is sealed (which may be achieved under atmospheric pressure using conventional systems such as a canning or bottling line), the pressurisation of the primary and secondary headspaces is achieved by the evolution of gas from the beverage within the primary and secondary chambers as the package is handled or stored at an ambient or dispensing temperature (greater than the charging temperature) and the contents of the container adopt a state of equilibrium. Following the sealing of the container, the package may be subjected to a heating and cooling cycle, conveniently during pasteurisation of the beverage.

The restricted orifice through which the primary and secondary chambers communicate is conveniently formed by a single aperture in a side wall of the secondary chamber and such an aperture should have a size which is sufficiently great to alleviate "clogging" or its obturation by particles which may normally be expected to occur within the beverage and yet be restricted in its dimensions to ensure that there is an adequate jetting effect in the ejection of the beverage therethrough from the secondary chamber into the primary chamber to promote the head formation upon opening of the container. The restricted orifice may be of any profile (such as a slit or a star shape) but will usually be circular; experiments have indicated that a restricted orifice having a diameter in the range of 0.02 to 0.25 centimetres is likely to be appropriate for fermented beverages (the preferred diameter being 0.061 centimetres). It is also preferred that when the package is positioned in an upstanding condition in which it is likely to be transported, shelf stored or opened, the restricted orifice is located in an upwardly extending side wall or in a bottom wall of the secondary chamber and preferably at a position slightly spaced from the bottom of the primary chamber. When the contents of the sealed package are in equilibrium and the package is in an upstanding condition as aforementioned, the restricted orifice is located below the depth of the beverage in the secondary chamber so that on opening of the container the pressure of gas in the secondary headspace initially ejects beverage from that chamber into the beverage in the primary chamber to promote the head formation. Such ejection of beverage through the restricted orifice provides a greater efficiency in the development of the head in a liquid supersaturated with gas than will the ejection of gas alone through the restricted orifice; the reason for this is that the restricted orifice provides a very active site which causes the beverage to "rip itself apart" generating extremely minute bubbles which themselves act as active sites for the beverage in the primary chamber, these extremely minute bubbles leave "vapour trails" of larger initiated bubbles which in turn produce the head. Since the extremely minute bubbles are travelling at relatively high speed during their injection into the beverage in the primary chamber, they not only generate shear forces on the beverage in that chamber but the ef-

fect of each such bubble is distributed over a volume of beverage much larger than the immediate surroundings of an otherwise stationary bubble.

A particular advantage of the present invention is that prior to the container being charged with beverage both the primary and secondary chambers can be at atmospheric pressure and indeed may contain air. However, it is recognized that for many beverages, particularly a fermented beverage, prolonged storage of the beverage in contact with air, especially oxygen, is undesirable as adversely affecting the characteristics of the beverage. To alleviate this possibility the secondary chamber may initially be filled with a "non-contaminant" gas such as nitrogen (or other inert gas or carbon dioxide) which does not adversely affect the characteristics of the beverage during prolonged contact therewith. The secondary chamber may be filled with the non-contaminant gas at atmospheric pressure or slightly greater (to alleviate the inadvertent intake of air) so that when the container is charged with the beverage, the non-contaminant gas will form part of the pressurised headspace in the secondary chamber. As previously mentioned, the secondary chamber may be formed by an envelope or hollow pod which is located as a discrete insert within a conventional form of can, bottle or carton and such a discrete insert permits the secondary chamber to be filled with the non-contaminant gas prior to the envelope or pod being located within the can, bottle or carton. A convenient means of achieving this latter effect is by blow moulding the envelope or pod in a food grade plastics material using the non-contaminant gas as the blowing medium and thereafter sealing the envelope or pod to retain the non-contaminant gas therein; immediately prior to the pod or envelope being inserted into the can, bottle or carton, the restricted orifice can be formed in a side wall of the pod or envelope (for example by laser boring). Immediately prior to the container being sealed it is also preferable to remove air from the primary headspace and this may be achieved using conventional techniques such as filling the headspace with froth or fob developed from a source remote from the container and having characteristics similar to those of the head which is to be formed from the beverage in the container; charging the primary chamber with the beverage in a nitrogen or other inert gas atmosphere so that the headspace is filled with that inert gas or nitrogen; dosing the headspace with liquid nitrogen so that the gas evolved therefrom expels the air from the headspace, or by use of undercover gassing or water jetting techniques to exclude air.

The secondary chamber may be charged with beverage from the primary chamber at ambient temperature. It is possible to ensure that the secondary chamber is efficiently charged by applying an auxiliary pressure to the headspace of the primary chamber (relative to the headspace in the secondary chamber) and allowing the pressures in the container to equilibrate after the primary chamber has been sealed. An efficient means of applying an auxiliary pressure is by use of the aforementioned liquid nitrogen dosing where a dose of liquid nitrogen

is applied to the headspace of the beverage in the primary chamber immediately before that chamber is sealed so that, following sealing, the development of pressure in the primary headspace (assisted by the evolution of nitrogen gas from the dosing) forces beverage from the primary chamber into the secondary chamber (by way of the restricted orifice) until a state of equilibrium is reached for the contents of the container.

Although the secondary chamber may be constructed as an integral part of the container, for the reasons discussed above and also convenience of manufacture, it is preferred that the secondary chamber is formed as a discrete insert which is simply deposited or pushed into a conventional form of can, bottle or carton. With cans or cartons such an insert will not be visible to the end user and many bottled beverages are traditionally marketed in dark coloured glass or plastics so that the insert is unlikely to adversely affect the aesthetics of the package. The discrete insert may be suspended or float in the beverage in the primary chamber provided that the restricted orifice is maintained below the surface of the beverage in the primary chamber on opening of the container; for example the insert may be loaded or weighted to appropriately orientate the position of the restricted orifice. Desirably however the insert is restrained from displacement within the outer container of the package and may be retained in position, for example at the bottom of the outer container, by an appropriate adhesive or by mechanical means such as projections on the package which may flex to abut and grip a side wall of the outer container or which may engage beneath an internal abutment on the side wall of the outer container.

DRAWINGS

One embodiment of the present invention as applied to the packaging of a fermented beverage such as stout in a can will now be described, by way of example only, with reference to the accompanying illustrative drawings, in which:

Figures 1 to 4 diagrammatically illustrate the progressive stages in the formation of the beverage package in a canning line, and Figure 5 diagrammatically illustrates the effect on opening the beverage package prior to consumption of the beverage and the development of the head of froth on the beverage.

DETAILED DESCRIPTION OF DRAWINGS

The present embodiment will be considered in relation to the preparation of a sealed can containing stout having in solution a mixture of nitrogen and carbon dioxide gases, the former preferably being present to the extent of at least 1.5% vols/vol and typically in the range 1.5% to 3.5% vols/vol and the carbon dioxide being present at a considerably lower level than the amount of carbon dioxide which would normally be present in conventional, wholly carbonated, bottled or canned stout and typically in

the range 0.8 to 1.8 vols/vol (1.46 to 3.29 grams/litre). For the avoidance of doubt, a definition of the term "vols/vol" is to be found in our G.B. Patent No. 1 588 624.

The stout is to be packaged in a conventional form of cylindrical can (typically of aluminium alloy) which, in the present example, will be regarded as having a capacity of 500 millilitres and by use of a conventional form of filling and canning line appropriately modified as will hereinafter be described. A cylindrical shell for the can 1 having a sealed base 2 and an open top 3 is passed in an upstanding condition along the line to a station shown in Figure 1 to present its open top beneath a stack of hollow pods 4. Each pod 4 is moulded in a food grade plastics material such as polypropylene to have a short (say 5 millimetres) hollow cylindrical housing part 5 and a circumferentially spaced array of radially outwardly extending flexible tabs or lugs 6. The pods 4 are placed in the stack with the chamber formed by the housing part 5 sealed and containing nitrogen gas at atmospheric pressure (or at pressure slightly above atmospheric); conveniently this is achieved by blow moulding the housing part 5 using nitrogen gas. The volume within the housing part 5 is approximately 15 millilitres. At the station shown in Figure 1 the bottom pod 4 of the stack is displaced by suitable means (not shown) into the open topped can 1 as shown. However, immediately prior to the pod 4 being moved into the can 1 a small (restricted) hole 7 is bored in the cylindrical side wall of the housing part 5. In the present example, the hole 7 has a diameter in the order of 0.61 millimetres and is conveniently bored by a laser beam generated by device 7a (although the hole could be formed by punching or drilling). The hole 7 is located towards the bottom of the cylindrical chamber within the housing part 5. Since the hollow pod 4 contains nitrogen gas at atmospheric pressure (or slightly higher) it is unlikely that air will enter the hollow pod through the hole 7 during the period between boring the hole 7 and charging of the can 1 with stout (thereby alleviating contamination of the stout by an oxygen content within the hollow pod 4).

The hollow pod 4 is pressed into the can 1 to be seated on the base 2. Conventional cans 1 have a domed base 2 (shown by the section 2a) which presents a convex internal face so that when the pod 4 abuts this face a clearance is provided between the hole 7 and the underlying bottom of the chamber within the can 1. It will be seen from Figure 1 that the diameter of the housing part 5 of the pod 4 is less than the internal diameter of the can 1 while the diameter of the outermost edges of the lugs 6 is greater than the diameter of the can 1 so that as the pod 4 is pressed downwardly into the can, the lugs 6 abut the side wall of the can and flex upwardly as shown to grip the can side wall and thereby restrain the hollow pod from displacement away from the base 2.

The open topped can with its pod 4 is now displaced along the canning line to the station shown in Figure 2 where the can is charged with approximately 440 millilitres of stout 8 from an appropriate source 9. The stout 8 is supersaturated with the

mixed carbon dioxide and nitrogen gases, typically the carbon dioxide gas being present at 1.5 vols/vol (2.74 grams/litre) and the nitrogen gas being present at 2% vols/vol. The charging of the can 1 with the stout may be achieved in conventional manner, that is under a counterpressure and at a temperature of approximately 0°C. When the can 1 is charged with the appropriate quantity of stout 8, the headspace above the stout is purged of air, for example by use of liquid nitrogen dosing or with nitrogen gas delivered by means indicated at 10 to alleviate contamination of the stout from oxygen in the headspace.

Following charging of the can 1 with stout and purging of the headspace, the can moves to the station shown in Figure 3 where it is closed and sealed under atmospheric pressure and in conventional manner by a lid 11 seamed to the cylindrical side wall of the can. The lid 11 has a pull-ring 12 attached to a weakened tear-out region 13 by which the can is intended to be broached in conventional manner for dispensing of the contents.

Following sealing, the packaged stout is subjected to a pasteurisation process whereby the package is heated to approximately 60°C for about 15-20 minutes and is thereafter cooled to ambient temperature. Stout flows from the chamber of the can into the chamber of the pod so that when the package is at ambient temperature the hole 7 is located below the depth of stout 8a within the hollow pod 4.

Following the pasteurisation process the contents of the can 1 will stabilise in a condition of equilibrium with a headspace 1a over the stout 8 in the primary chamber of the can and a headspace 4a over the stout 8a in the secondary chamber formed by the hollow pod 4 and in the equilibrium condition. With the sealed can at ambient temperature (or a typical storage or dispensing temperature which may be, say, 8°C) the pressure of mixed gases carbon dioxide and nitrogen (which largely results from the evolution of such gases from the stout) is substantially the same in the headspaces 1a and 4a and this pressure will be greater than atmospheric pressure, typically in the order of 251bs per square inch (1.72 bars).

The package in the condition shown in Figure 4 is typically that which would be made available for storage and retail purposes. During handling it is realised that the package may be tipped from its upright condition; in practice however this is unlikely to adversely affect the contents of the hollow pod 4 because of the condition of equilibrium within the can.

When the stout is to be made available for consumption, the can 1 is opened by ripping out the region 13 with the pull-ring 12. On broaching the lid 11 as indicated at 14 the headspace 1a rapidly depressurises to atmospheric pressure. As a consequence the pressure within the headspace 4a of the secondary chamber in the pod 4 exceeds that in the headspace 1a and causes stout 8a in the hollow pod to be ejected by way of the hole 7 into the stout 8 in the primary chamber of the can. The restrictor hole 7 acts as a very "active site" to the supersaturated stout 8a which passes therethrough to be injected

into the stout 8 and that stout is effectively "ripped apart" to generate extremely minute bubbles which themselves act as active sites for the stout 8 into which they are injected. These minute bubbles leave "vapour trails" of larger initiated bubbles which develop within the headspace 1a a head 8b having the previously discussed desirable characteristics.

It is appreciated that the headspace 1a occupies a larger proportion of the volume of the can 1 than that which would normally be expected in a 500 millilitre capacity can; the reason for this is to ensure that there is adequate volume in the headspace 1a for the head of froth 8b to develop efficiently in the event, for example, that the stout is to be consumed directly from the can when the tear-out region 13 is removed. Normally however the stout 8 will first be poured from the can into an open topped drinking vessel prior to consumption but this pouring should not adversely affect the desirable characteristics of the head of froth which will eventually be presented in the drinking vessel.

In the aforesaid embodiment the can 1 is charged with stout 8 (from the source 9) having in solution the required respective volumes of the carbon dioxide and the nitrogen gases. In a modification the can 1 is charged with stout (from source 9) having the carbon dioxide gas only in solution to the required volume; the 2% vols/vol nitrogen gas necessary to achieve the required solution of mixed gas in the packaged stout is derived from the liquid nitrogen dosing of the headspace in the can.

Claims

1. A beverage package comprising a sealed, non-resealable, container (1, 2, 11) having a primary chamber containing beverage (8) having gas in solution therewith and forming a primary headspace (1a) comprising gas at a pressure greater than atmospheric; a secondary chamber (4) having a volume less than said primary chamber and which communicates with the beverage (8) in said primary chamber through a restricted orifice (7), characterised in that the secondary chamber (4) contains beverage (8a) derived from the primary chamber and has a secondary headspace (4a) therein comprising gas at a pressure greater than atmospheric so that the pressures within the primary and secondary chambers (4) are substantially at equilibrium, and wherein said package is openable (13), to open the primary headspace (1a) to atmospheric pressure and the secondary chamber (4) is arranged so that on said opening the pressure differential caused by the decrease in pressure at the primary headspace (1a) causes beverage (8a) in the secondary chamber (4) to be ejected by way of the restricted orifice (7) into the beverage (8) of the primary chamber and said ejection causes gas in the solution to be evolved and form, or assist in the formation of, a head of froth (8b) on the beverage (8).

2. A package as claimed in claim 1 in which the container has a normal upstanding condition with an openable top (11) and said secondary chamber (4)

has an upwardly extending side wall or a bottom wall within which said restricted orifice (7) is located.

3. A package as claimed in either claim 1 or claim 2 wherein the secondary chamber comprises a hollow and discrete insert (4) within the container.

4. A package as claimed in claim 3 in which the insert (4) floats or is suspended in the beverage (8) in the primary chamber and means is provided for locating the restricted orifice (7) below the surface of the beverage in the primary chamber.

5. A package as claimed in claim 4 in which the insert (4) is weighted or loaded to locate the restricted orifice (7) below the surface of the beverage in the primary chamber.

6. A package as claimed in claim 3 wherein means (6) is provided for retaining the insert (4) at a predetermined position within the container (1, 2, 11).

7. A package as claimed in claim 6 wherein the container (1, 2, 11) has a normal upstanding condition with an openable top (11) and said insert (4) is located at or towards the bottom (2) of said container.

8. A package as claimed in either claim 6 or claim 7 wherein the insert comprises a hollow pod (4) or envelope having means (6) thereon for retaining it in position within the container (1, 2, 11).

9. A package as claimed in claim 8 wherein the retaining means comprise flexible tab means (6) which engage a side wall (1) of the container to retain the insert (4).

10. A package as claimed in any one of claims 3 to 9 wherein the insert comprises a hollow moulding (4).

11. A package as claimed in claim 10 when appendant to claim 9 in which the moulding (4) is substantially cylindrical with radially extending tabs (6) engaging the side wall (1) of the container.

12. A package as claimed in any one of claims 3 to 11 in which the container has a base (2) on which the insert (4) is located and said restricted orifice (7) is located in an upwardly extending side wall of the insert (4) spaced from said base (2).

13. A package as claimed in any one of the preceding claims in which the beverage has in solution therewith at least one of carbon dioxide gas and inert gas (which latter term includes nitrogen).

14. A package as claimed in claim 14 in which the beverage is supersaturated with said gas or gases.

15. A package as claimed in any one of the preceding claims in which the container is in the form of a can (1, 2, 11), bottle or carton.

16. A package as claimed in any one of the preceding claims in which the restricted orifice (7) comprises a circular aperture having a diameter in the range of 0.02 to 0.25 centimetres.

17. A package as claimed in any one of the preceding claims and comprising a fermented beverage (8, 8a) having in solution therewith carbon dioxide in the range 0.8 to 1.8 vols/vol (1.46 to 3.29 grams/litre) and nitrogen in the range 1.5% to 3.5% vols/vol.

18. A method of packaging a beverage having gas in solution therewith which comprises providing a container with a primary chamber (1, 2, 11) and a secondary chamber (4) of which the volume of the secondary chamber is less than that of the primary chamber and with a restricted orifice (7) through

which the secondary chamber (4) communicates with the primary chamber, and charging and sealing the primary chamber (1, 2, 11) with the beverage (8) to contain the gas in solution and to form a primary headspace (1a) in the primary chamber, and characterised by charging the secondary chamber (4) with beverage (8a) derived from the primary chamber (1, 2, 11) by way of said restricted orifice (7) to form a secondary headspace (4a) in the secondary chamber (4) whereby the pressures in both the primary (1, 2, 11) and secondary chambers (4) are at equilibrium and gaseous pressures in both the primary and secondary headspaces (1a, 4a) are at a pressure greater than atmospheric so that, when the container is broached to open the primary headspace (1a) to atmospheric pressure, the pressure differential caused by the decrease in pressure at the primary headspace (1a) causes beverage (8a) in the secondary chamber (4) to be ejected into the beverage (8) of the primary chamber by way of said restricted orifice (7) and the said ejection causes gas to be evolved from solution in the beverage (8) in the primary chamber to form, or assist in the formation of, a head of froth (8b) on the beverage (8).

19. A method as claimed in claim 18 which comprises subjecting the sealed container to a heating and cooling cycle.

20. A method as claimed in claim 19 in which the heating and cooling cycle comprises pasteurisation of the beverage.

21. A method as claimed in any one of claims 18 to 20 in which the container has an upstanding condition with an openable top (11) and which comprises locating the restricted orifice (7) within an upwardly extending side wall or bottom wall of the secondary chamber.

22. A method as claimed in any one of claims 18 to 21 which comprises forming the secondary chamber by a discrete hollow insert (4) located within the primary chamber of the container (1, 2, 11).

23. A method as claimed in claim 22 in which the hollow insert (4) is to float or be suspended in the beverage (8) in the primary chamber and which comprises loading or weighting the insert (4) to locate the restricted orifice (7) below the surface of the beverage (8) in the primary chamber.

24. A method as claimed in claim 22 which comprises retaining the insert (4) at a predetermined position within the container.

25. A method as claimed in any one of claims 22 to 24 which comprises forming the hollow insert (4) having the restricted orifice (7) in a wall thereof and locating the insert (4) within the primary chamber prior to the charging and sealing of the primary chamber.

26. A method as claimed in any one of claims 22 to 25 which comprises forming the hollow insert (4) by blow moulding.

27. A method as claimed in claim 26 which comprises blow moulding the hollow insert (4) with gas for dissolution in the beverage (8) so that said gas is sealed within the secondary chamber, and forming said restricted orifice (7) in the wall of the insert immediately prior to locating the insert (4) in the primary chamber.

28. A method as claimed in claim 27 which comprises sealing said gas in the secondary chamber at atmospheric pressure or at a pressure slightly greater than atmospheric.

5 29. A method as claimed in any one of claims 22 to 28 which comprises forming the restricted orifice (7) in the 5 hollow insert (4) by laser boring, drilling or punching.

10 30. A method as claimed in any one of claims 22 to 29 in which, prior to it being sealed, the container has an upstanding condition with an open top (3) through which the primary chamber is charged with beverage (8) and which comprises locating the insert (4) through said open top (3) to provide the secondary chamber within the container.

15 31. A method as claimed in claim 30 when appendant to claim 24 which comprises press fitting the insert (4) within the container so that during its location the insert (4) engages with a side wall (1) of the container to be retained in position.

20 32. A method as claimed in any one of claims 18 to 31 which comprises, prior to sealing the primary chamber, purging the primary head space (1a) to exclude air.

25 33. A method as claimed in any one of claims 18 to 32 which comprises applying an auxiliary pressure to the headspace (1a) of the primary chamber and allowing the pressures within the container to equilibrate when the primary chamber is sealed.

30 34. A method as claimed in claim 33 which comprises applying the auxiliary pressure to the headspace (1a) of the primary chamber as a result of liquid nitrogen dosing prior to the primary chamber being sealed.

35 35. A method as claimed in any one of claims 18 to 34 in which the gas comprises at least one carbon dioxide gas and inert gas (which latter term includes nitrogen).

40 36. A method as claimed in claim 35 in which the beverage is fermented and has in solution carbon dioxide in the range 0.8 to 1.8 vols/vol (1.46 to 3.29 grams/litre) and nitrogen in the range 1.5% to 3.5% vols/vol.

45 Patentansprüche

1. Getränkebehälter, bestehend aus einem nicht erneut verschließbaren Behälter (1, 2, 11), mit einer Hauptkammer (8) zur Aufnahme eines gelösten Gases enthaltenden Getränkes und einem Leerraum (1a), der Gas unter Überdruck enthält, mit einer zweiten Kammer (4) von gegenüber der Hauptkammer kleinerem Volumen, die mit dem Getränk (8) in der Hauptkammer über eine Kapillardrossel (7) in Verbindung steht, dadurch gekennzeichnet, daß die zweite Kammer (4) aus der Hauptkammer abgezogenes Getränk (8a) enthält und einen zweiten, ein Gas mit Überdruck enthaltenden Leerraum (4a) aufweist, so daß in der Hauptkammer und in der zweiten Kammer im wesentlichen gleicher Druck herrscht, daß der Getränkebehälter zwecks Öffnung des Leerraumes der Hauptkammer gegen Luftdruck geöffnet werden kann, daß die zweite Kammer (4) derart angeordnet ist, daß der beim Öffnen entstehende Druckunterschied infolge des Druckabfalls im

Leerraum (1a) den Austritt des Getränks aus der zweiten Kammer (4) durch die Kapillardrossel (7) in das Getränk (8) der Hauptkammer bewirkt, und daß während des Getränkeaustritts das darin gelöste Gas zur Schaumbildung auf dem Getränk bzw. zur Unterstützung der Schaumbildung freigesetzt wird.

2. Getränkeverpackung nach Anspruch 1, dadurch gekennzeichnet, daß der Behälter im Grundzustand senkrecht steht und eine zu öffnende Oberseite (11) aufweist und daß die zweite Kammer (4) eine senkrecht stehende Seitenwandung oder einen Boden zur Aufnahme der Kapillardrossel (7) aufweist.

3. Getränkebehälter nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die zweite Kammer aus einem hohen, separaten Einsatz (4) im Behälter besteht.

4. Getränkebehälter nach Anspruch 3, dadurch gekennzeichnet, daß der Einsatz (4) im Getränk (8) in der Hauptkammer schwimmt oder gehalten ist und daß Mittel vorgesehen sind, die die Kapillardrossel (7) unterhalb der Getränkeoberfläche in der Hauptkammer positionieren.

5. Getränkebehälter nach Anspruch 4, dadurch gekennzeichnet, daß der Einsatz (4) zwecks Positionierung der Kapillardrossel (7) unterhalb der Getränkeoberfläche in der Hauptkammer entsprechend gewichtet oder gefüllt ist.

6. Getränkebehälter nach Anspruch 3, gekennzeichnet durch Mittel zur definierten Positionierung des Einsatzes (4) innerhalb des Behälters (1, 2, 11).

7. Getränkebehälter nach Anspruch 6, dadurch gekennzeichnet, daß der Behälter (1, 2, 11) im Grundzustand aufrechtsteht und eine zu öffnende Oberseite (11) aufweist, und daß der Einsatz (4) am Boden oder im Bereich des Bodens (2) des Behälters angeordnet ist.

8. Getränkebehälter nach Anspruch 6 oder 7, dadurch gekennzeichnet, daß der Einsatz (4) aus einem Hohlkörper (4) oder Mantel besteht und Mittel (6) zu seiner Positionierung innerhalb des Behälters (1, 2, 11) aufweist.

9. Getränkebehälter nach Anspruch 8, dadurch gekennzeichnet, daß die Positionierungsmittel aus biegsamen Ansätzen oder Laschen (6) bestehen, die sich an der Seitenwandung des Behälters zur Festlegung des Einsatzes (4) abstützen.

10. Getränkebehälter nach einem oder mehreren der Ansprüche 3 bis 9, dadurch gekennzeichnet, daß der Einsatz aus einem hohen Formkörper (4) besteht.

11. Getränkebehälter nach Anspruch 10, sofern von Anspruch 9 abhängig, dadurch gekennzeichnet, daß der Formkörper (4) im wesentlichen zylindrisch mit radial nach außen vorstehenden Laschen (6) ist, die sich an der Seitenwandung (1) des Behälters abstützen.

12. Getränkebehälter nach einem der Ansprüche 3 bis 11, dadurch gekennzeichnet, daß der Behälter einen Boden (2) zur Aufnahme des Einsatzes (4) aufweist und daß die Kapillardrossel (7) in einer senkrechten Seitenwand des Einsatzes (4) im Abstand vom Behälterboden (2) angeordnet ist.

13. Getränkebehälter nach einem oder mehreren der vorhergehenden Ansprüche, dadurch gekenn-

zeichnet, daß das Getränk mindestens gelöstes Kohlendioxid und Edelgas (unter Einschluß von Stickstoff) enthält.

14. Getränkebehälter nach Anspruch 13, dadurch gekennzeichnet, daß das Getränk mit Gas bzw. Gasen übersättigt ist.

15. Getränkebehälter nach Anspruch 14, dadurch gekennzeichnet, daß der Behälter die Form einer Büchse (1, 2, 11), einer Flasche oder eines Kartons hat.

16. Getränkebehälter nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Kapillardrossel (7) aus einer kreisförmigen Öffnung mit einem Durchmesser zwischen 0,02 bis 0,25 cm besteht.

17. Getränkebehälter nach einem der vorhergehenden Ansprüche für ein fermentiertes Getränk (8, 8a), das gelöstes Kohlendioxid zwischen 0,8 bis 1,8 Volumprozent (1,46 bis 3,29 g/l) und Stickstoff zwischen 1,5 bis 3,5 Volumprozent enthält.

18. Verfahren zum Verpacken eines gelösten Gases enthaltenden Getränks in einem Behälter mit einer Hauptkammer (1, 2, 11) und einer zweiten Kammer (4) mit gegenüber der Hauptkammer kleinerem Volumen und mit einer zweiten Kammer (4) mit der Hauptkammer verbindenden Kapillardrossel (7) zum Füllen des gelösten Gases enthaltenden Getränks in die Hauptkammer (1, 2, 11) und Verschließen unter Bildung eines Leerraumes (1a) in der Hauptkammer, dadurch gekennzeichnet, daß der zweite Kammer (4) Getränk (8a) aus der Hauptkammer über die Kapillardrossel (7) unter Bildung eines zweiten Leerraumes (4a) zufließt, wobei zwischen der Hauptkammer und der zweiten Kammer Druckausgleich besteht und das Gas in den beiden Leerräumen Überdruck hat, derart, daß beim Anzapfen des Behälters, wenn der Leerraum der Hauptkammer (1a) atmosphärischem Druck ausgesetzt wird, der entstehende Druckunterschied den Austritt des Getränks (8a) in der zweiten Kammer (4) über die Kapillardrossel (7) in das Getränk (8) der Hauptkammer bewirkt, und daß während des Getränkeaustritts das darin gelöste Gas zur Schaumbildung im Getränk bzw. zur Unterstützung der Schaumbildung freigesetzt wird.

19. Verfahren nach Anspruch 18, dadurch gekennzeichnet, daß der verschlossene Behälter einem Erhitzungs- und Abkühlungszyklus unterworfen wird.

20. Verfahren nach Anspruch 19, dadurch gekennzeichnet, daß der Erhitzungs- und Kühlungszyklus eine Pasteurisierung des Getränks umfaßt.

21. Verfahren nach einem der Ansprüche 18 bis 20, dadurch gekennzeichnet, daß der aufrechtstehende Behälter eine zu öffnende Oberseite (11) aufweist und daß die Kapillardrossel (7) in eine senkrechte Wand oder in den Boden der zweiten Kammer angebracht wird.

22. Verfahren nach einem der Ansprüche 18 bis 21, gekennzeichnet durch Ausbildung der zweiten Kammer als in der Hauptkammer des Behälters (1, 2, 11) angeordneter separater Hohlkörper (4).

23. Verfahren nach Anspruch 22, dadurch gekennzeichnet, daß der Hohlkörper (4) im Getränk (8) in der Hauptkammer schwimmt oder gehalten ist

und daß der Hohlkörper (4) nach Gewicht oder Füllung derart bemessen ist, daß die Kapillardrossel (7) unterhalb der Getränkeoberfläche (8) in der Hauptkammer vorgesehen ist.

24. Verfahren nach Anspruch 22, dadurch gekennzeichnet, daß der Hohlkörper (4) innerhalb des Behälters in einer definierten Stellung gehalten ist.

25. Verfahren nach einem der Ansprüche 22 bis 24, dadurch gekennzeichnet, daß der Hohlkörper (4) mit der Kapillardrossel (7) in einer seiner Wandungen ausgebildet wird und in die Hauptkammer vor deren Füllung und Verschließen eingesetzt wird.

26. Verfahren nach einem der Ansprüche 22 bis 25, dadurch gekennzeichnet, daß der Hohlkörper (4) mittels Blasverfahren geformt wird.

27. Verfahren nach Anspruch 26, gekennzeichnet durch Herstellung des Hohlkörpers (4) im Blasverfahren mittels Gas zur Lösung im Getränk (8), derart, daß das Gas innerhalb der zweiten Kammer verbleibt und daß die Kapillardrossel (7) in der Wandung des Hohlkörpers unmittelbar vor Positionierung des Hohlkörpers (4) in der Hauptkammer ausgebildet wird.

28. Verfahren nach Anspruch 27, dadurch gekennzeichnet, daß das Gas in der zweiten Kammer atmosphärischen Druck oder einen geringfügig darüberstehenden Druck aufweist.

29. Verfahren nach einem der Ansprüche 22 bis 28, dadurch gekennzeichnet, daß die Kapillardrossel (7) im Hohlkörper (4) durch Laserbohrung, Bohren oder Stanzen angebracht wird.

30. Verfahren nach einem der Ansprüche 22 bis 28, dadurch gekennzeichnet, daß der Behälter vor dem Verschließen aufrechtsteht und eine offene Oberseite (3) zum Einfüllen des Getränks (8) in die Hauptkammer aufweist, und daß der Hohlkörper (4) durch die offene Oberseite (3) zur Bildung der zweiten Kammer im Behälter eingesetzt wird.

31. Verfahren nach Anspruch 30, sofern von Anspruch 24 abhängig, dadurch gekennzeichnet, daß der Hohlkörper (4) im Behälter durch Preßsitz gehalten ist, so daß der Hohlkörper (4) beim Einsetzen sich gegen eine Seitenwandung (1) des Behälters zwecks Fixierung seiner Position abstützt.

32. Verfahren nach einem der Ansprüche 18 bis 31, dadurch gekennzeichnet, daß vor Verschließen der Hauptkammer die Luft in ihrem Leerraum (1a) evakuiert wird.

33. Verfahren nach einem der Ansprüche 18 bis 32, dadurch gekennzeichnet, daß auf den Leerraum (1a) der Hauptkammer hilfsweise Druck ausgeübt wird, so daß sich zwischen den Drücken im Behälter beim Verschließen der Hauptkammer Druckgleichgewicht einstellt.

34. Verfahren nach Anspruch 33, dadurch gekennzeichnet, daß der Hilfsdruck im Leerraum (1a) der Hauptkammer durch Zusatz von flüssigem Stickstoff vor Verschließen der Hauptkammer erzeugt wird.

35. Verfahren nach einem der Ansprüche 18 bis 34, dadurch gekennzeichnet, daß das Gas mindestens aus Kohlendioxyd und einem Edelgas (unter Einschluß von Stickstoff) besteht.

36. Verfahren nach Anspruch 35, dadurch gekennzeichnet, daß das Getränk gegoren ist und gelöstes Kohlendioxyd zwischen 0,8 bis 1,8 Volumprozent (1,46 bis 3,29 g/l) sowie Stickstoff zwischen 1,5 bis 3,5 Volumprozent enthält.

Revendications

1. Emballage de bolsson comprenant un récipient (1, 2, 11,) étanche, non réutilisable, ayant une chambre principale qui contient la boisson (8) présentant du gaz en solution et formant un espace sous pression principal (1a) comprenant du gaz à une pression plus élevée que la pression atmosphérique; une chambre secondaire (4) ayant un volume moindre que ladite chambre principale et qui communique avec la boisson (8) dans ladite chambre principale à travers un orifice calibré (7), caractérisé en ce que la chambre secondaire (4) contient une boisson (8a) provenant de la chambre principale et présente un espace sous pression secondaire (4a) comprenant du gaz à une pression plus élevée que la pression atmosphérique, de sorte que les pressions, à l'intérieur des chambres principale et secondaire (4) sont sensiblement équilibrées, et dans lequel ledit emballage est ouvrable (13), pour mettre l'espace sous pression principal (1a) à la pression atmosphérique, et la chambre secondaire (4) est agencée de façon que, lors de ladite ouverture, la pression différentielle engendrée par la diminution de pression dans l'espace sous pression principal (1a) entraîne l'éjection de la boisson (8a) dans la chambre secondaire (4) en passant par l'orifice calibré (7) dans la boisson (8) de la chambre principale, et ladite éjection engendre le dégagement du gaz en solution et la formation, ou l'aide à la formation, d'une mousse (8b) sur la boisson (8).

2. Emballage selon la revendication 1, dans lequel le récipient présente une condition normale droite avec un dessus ouvrable (11) et ladite chambre secondaire (4) présente une paroi latérale s'étendant vers le haut ou une paroi de fond à l'intérieur de laquelle ledit orifice calibré (7) est situé.

3. Emballage selon l'une des revendications 1 ou 2, dans lequel la chambre secondaire comprend un insert creux et discret (4) à l'intérieur du récipient.

4. Emballage selon la revendication 3, dans lequel ledit insert (4) flotte ou est en suspension dans la boisson (8) dans la chambre principale et des moyens sont prévus pour situer l'orifice calibré (7) au-dessous de la surface de la boisson dans la chambre principale.

5. Emballage selon la revendication 4, dans lequel l'insert (4) est pesant ou chargé pour situer l'orifice calibré (7) au-dessous de la surface de la boisson dans la chambre principale.

6. Emballage selon la revendication 3, dans lequel des moyens (6) sont prévus pour retenir l'insert (4) dans une position pré-déterminée à l'intérieur du récipient (1, 2, 11).

7. Emballage selon la revendication 6, dans lequel le récipient (1, 2, 11) présente une condition normale droite avec un dessus ouvrable (11) et ledit insert (4) est situé sur ou vers le fond (2) dudit récipient.

8. Emballage selon l'une des revendications 6 ou 7, dans lequel l'insert comprend un support ou une enveloppe creux (4) ayant des moyens (6) sur celui-ci pour le retenir en position à l'intérieur du récipient (1, 2, 11).

9. Emballage selon la revendication 8, dans lequel les moyens de retenue comprennent des moyens à pattes souples (6) lesquels engagent une paroi latérale (1) du récipient pour retenir l'insert (4).

10. Emballage selon l'une quelconque des revendications 3 à 9, dans lequel l'insert comprend un mouillage creux (4).

11. Emballage selon la revendication 10 quand elle dépend de la revendication 9, dans lequel le mouillage (4) est sensiblement cylindrique avec des pattes (6) s'étendant radialement en engageant la paroi latérale (1) du récipient.

12. Emballage selon l'une quelconque des revendications 3 à 11, dans lequel le récipient présente une base (2) sur laquelle l'insert (4) est situé et ledit orifice calibré (7) est situé dans une paroi latérale s'étendant vers le haut de l'insert (4) espacé de la dite base (2).

13. Emballage selon l'une quelconque des revendications précédentes dans lequel la boisson présente en solution du dioxyde de carbone et/ou un gaz inerte (lequel dernier terme inclut l'azote).

14. Emballage selon la revendication 13, dans lequel la boisson est sursaturée avec du ou des gaz.

15. Emballage selon l'une quelconque des revendications précédentes, dans lequel le récipient présente la forme d'une cannette (1, 2, 11), d'une bouteille ou d'une boîte en carton.

16. Emballage selon l'une quelconque des revendications précédentes, dans lequel l'orifice calibré (7) comprend une ouverture circulaire ayant un diamètre compris entre 0,02 à 0,25 cm.

17. Emballage selon l'une quelconque des revendications précédentes et comprenant une boisson fermentée (8, 8a) ayant en solution du dioxyde de carbone dans la plage de 0,8 à 1,8 vols/vol (1,46 à 3,29 grammes par litre) et de l'azote en proportion de 1,5% à 3,5% vols/vol.

18. Procédé d'emballage d'une boisson ayant du gaz en solution qui comprend les étapes suivantes: munir un récipient d'une chambre principale (1, 2, 11) et d'une chambre secondaire (4), dont le volume de la chambre secondaire est inférieur à celui de la chambre principale, et d'un orifice calibré (7) à travers lequel la chambre secondaire (4) communique avec la chambre principale, et remplir et rendre étanche la chambre principale (1, 2, 11) avec la boisson (8) pour contenir le gaz en solution et pour former un espace sous pression principal (1a) dans la chambre principale, et caractérisé par le remplissage de la chambre secondaire (4) avec la boisson (8a) issue de la chambre principale (1, 2, 11) en passant par ledit orifice calibré (7) pour former un espace sous pression secondaire (4a) dans la chambre secondaire (4) grâce à quoi les pressions à la fois dans les chambres principale (1, 2, 11) et secondaire (4) sont équilibrées et les pressions des gaz à la fois dans les espaces principal et secondaire (1a, 4a) sous pression sont à une pression plus élevée que la pression atmosphérique de sorte que, quand

le récipient est percé pour ouvrir l'espace principal sous pression (1a) à la pression atmosphérique, la pression différentielle produite par la diminution de pression dans l'espace principal sous pression (1a) entraîne l'éjection de la boisson (8a) dans la chambre secondaire (4) dans la boisson (8) de la chambre principale par ledit orifice calibré (7), et ladite éjection entraîne le dégagement du gaz en solution dans la boisson (8) dans la chambre principale pour former, ou aider à la formation, d'une mousse (8b) sur la boisson (8).

19. Procédé selon la revendication 18, qui comprend l'exposition du récipient fermé avec étanchéité à un cycle de chauffage et de refroidissement.

20. Procédé selon la revendication 19, dans lequel le cycle de chauffage et de refroidissement comprend la pasteurisation de la boisson.

21. Procédé selon l'une quelconque des revendications 18 à 20, dans lequel le récipient présente une condition droite avec un dessus ouvrable (11) et qui comprend l'agencement de l'orifice calibré (7) à l'intérieur d'une paroi latérale s'étendant vers le haut ou de la paroi de fond de la chambre secondaire.

22. Procédé selon l'une quelconque des revendications 18 à 21, qui comprend la formation de la chambre secondaire par un insert creux discret (4) situé à l'intérieur de la chambre principale du récipient (1, 2, 11).

23. Procédé selon la revendication 22, dans lequel l'insert creux (4) est destiné à flotter ou à être mis en suspension dans la boisson (8) dans la chambre principale et qui comprend le chargement ou le ballastage de l'insert (4) pour disposer l'orifice calibré (7) au-dessous de la surface de la boisson (8) dans la chambre principale.

24. Procédé selon la revendication 22 qui comprend le maintien de l'insert (4) à une position pré-déterminée à l'intérieur du récipient.

25. Procédé selon l'une quelconque des revendications 22 à 24, qui comprend la réalisation de l'insert creux (4) ayant l'orifice calibré (7) dans une paroi de celui-ci et l'emplacement de l'insert (4) à l'intérieur de la chambre principale, avant le remplissage et la fermeture étanche de la chambre principale.

26. Procédé selon l'une quelconque des revendications 22 à 25, qui comprend la réalisation de l'insert creux (4) par mouillage par soufflage.

27. Procédé selon la revendication 26, qui comprend le mouillage par soufflage de l'insert creux (4) avec du gaz pour se dissoudre dans la boisson (8), de sorte que ledit gaz est hermétiquement contenu à l'intérieur de la chambre secondaire, et la réalisation dudit orifice calibré (7) dans la paroi de l'insert immédiatement avant de placer l'insert (4) dans la chambre principale.

28. Procédé selon la revendication 27, qui comprend l'introduction dudit gaz dans la chambre secondaire à la pression atmosphérique ou à une pression légèrement plus élevée que la pression atmosphérique.

29. Procédé selon l'une quelconque des revendications 22 à 28, qui comprend la réalisation de l'orifice calibré (7) dans l'insert creux (4) par forage, perçage ou découpage au laser.

30. Procédé selon l'une quelconque des revendications 22 à 29, dans lequel, avant d'être fermé de façon étanche, le récipient a une condition droite avec un dessus (3) ouvert à travers lequel la chambre principale est remplie avec la boisson (8) et qui comprend la mise en place de l'insert (4) à travers ledit dessus ouvert (3) pour réaliser la chambre secondaire à l'intérieur du récipient.

5

31. Procédé selon la revendication 30 quand elle dépend de la revendication 24, qui comprend l'engagement à force de l'insert (4) à l'intérieur du récipient, de sorte que durant sa mise en place l'insert (4) engage une paroi latérale (1) du récipient pour être maintenu en position.

10

32. Procédé selon l'une quelconque des revendications 18 à 31, qui comprend, avant la fermeture étanche de la chambre principale, la purge de l'espace sous pression principal (1a) pour évacuer l'air.

15

33. Procédé selon l'une quelconque des revendications 18 à 32, qui comprend l'application d'une pression auxiliaire dans l'espace sous pression (1a) de la chambre principale et l'équilibrage des pressions à l'intérieur du récipient quand la chambre principale est fermée de façon étanche.

20

34. Procédé selon la revendication 33, qui comprend l'application de la pression auxiliaire à l'espace sous pression (1a) de la chambre principale par l'amenée d'azote liquide avant la fermeture étanche de la chambre principale.

25

35. Procédé selon l'une quelconque des revendications 18 à 34, dans lequel le gaz comprend du dioxyde de carbone et/ou un gaz inerte (lequel dernier terme inclut l'azote).

30

36. Procédé selon la revendication 35, dans lequel la boisson est fermentée et présente en solution du dioxyde de carbone dans la plage de 0,8 à 1,8 vols/vol (1,46 à 3,29 grammes par litre) et de l'azote en proportion de 1,5% à 3,5% vols/vol.

35

40

45

50

55

60

65

FIG. 1.

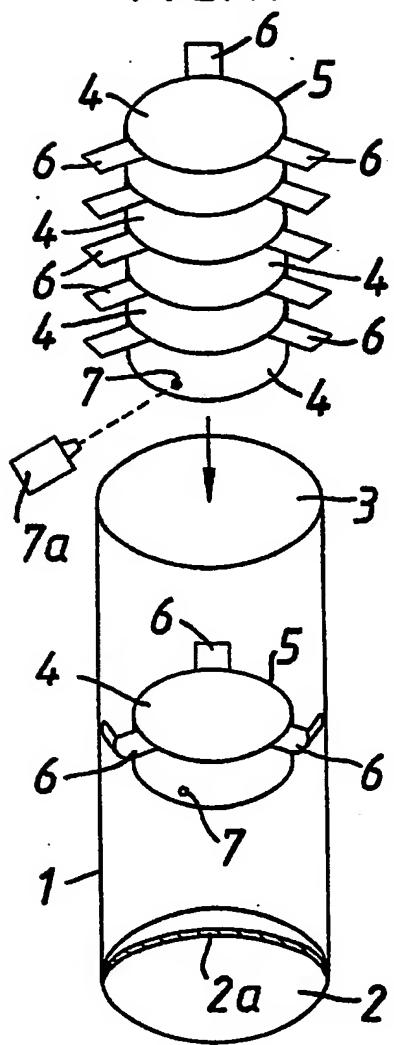


FIG. 2.

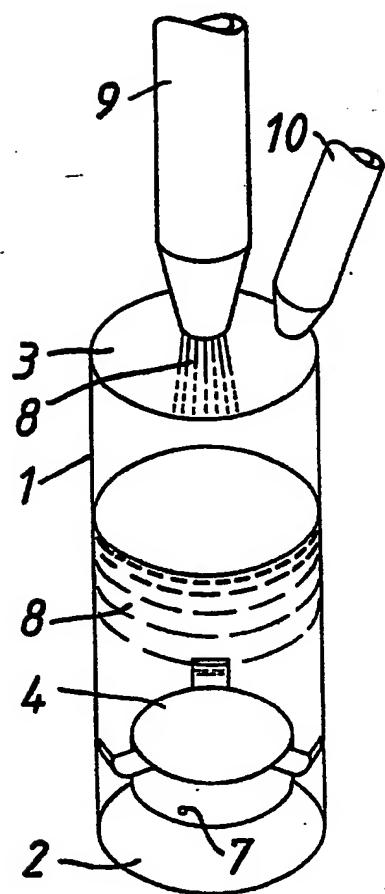


FIG. 3.

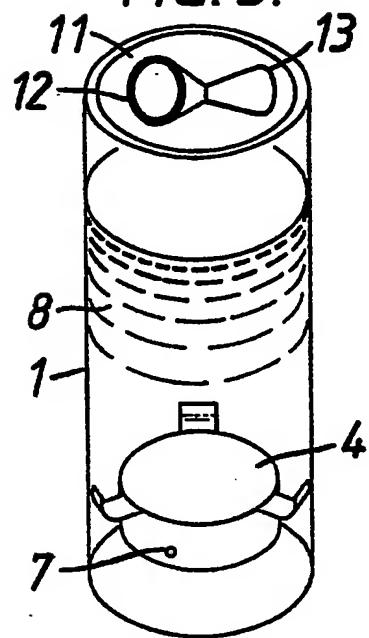


FIG. 4.

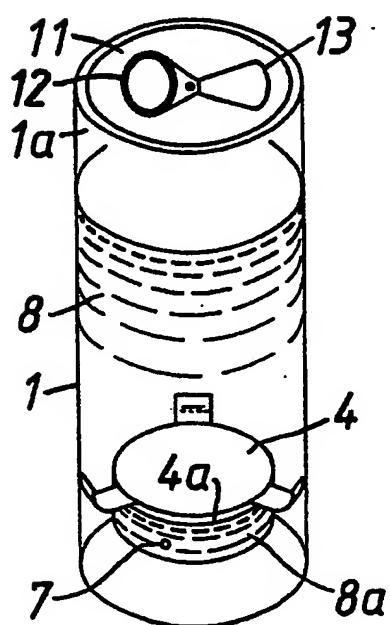
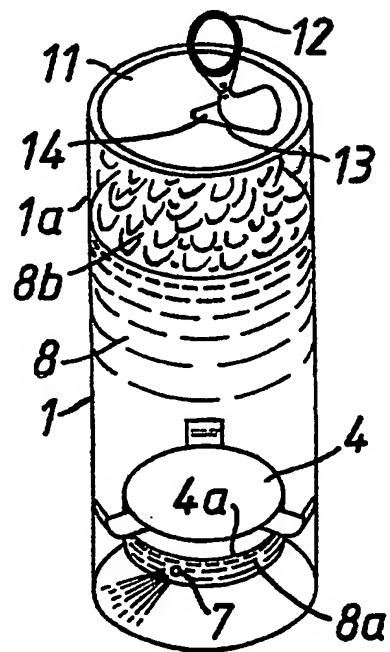


FIG. 5.



**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.